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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/556,831	11/15/2005	Claude Bourgeois	09894.0005-00	1701
22852	7590	10/16/2007		
FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER LLP 901 NEW YORK AVENUE, NW WASHINGTON, DC 20001-4413			EXAMINER ROSENAU, DEREK JOHN	
			ART UNIT 2834	PAPER NUMBER
			MAIL DATE 10/16/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/556,831	<b>Applicant(s)</b> BOURGEOIS, CLAUDE	
	<b>Examiner</b> Derek J. Rosenau	<b>Art Unit</b> 2834	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 15 November 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 12-31 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 12-31 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 November 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>3/7/06</u> . | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Drawings***

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: 11, 50, and 51. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Specification***

The following guidelines illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use.

#### **Arrangement of the Specification**

As provided in 37 CFR 1.77(b), the specification of a utility application should include the following sections in order. Each of the lettered items should appear in upper case, without underlining or bold type, as a section heading. If no text follows the section heading, the phrase "Not Applicable" should follow the section heading:

- (a) TITLE OF THE INVENTION.
- (b) CROSS-REFERENCE TO RELATED APPLICATIONS.
- (c) STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT.

- (d) THE NAMES OF THE PARTIES TO A JOINT RESEARCH AGREEMENT.
- (e) INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC.
- (f) BACKGROUND OF THE INVENTION.
  - (1) Field of the Invention.
  - (2) Description of Related Art including information disclosed under 37 CFR 1.97 and 1.98.
- (g) BRIEF SUMMARY OF THE INVENTION.
- (h) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).
- (i) DETAILED DESCRIPTION OF THE INVENTION.
- (j) CLAIM OR CLAIMS (commencing on a separate sheet).
- (k) ABSTRACT OF THE DISCLOSURE (commencing on a separate sheet).
- (l) SEQUENCE LISTING (See MPEP § 2424 and 37 CFR 1.821-1.825. A "Sequence Listing" is required on paper if the application discloses a nucleotide or amino acid sequence as defined in 37 CFR 1.821(a) and if the required "Sequence Listing" is not submitted as an electronic document on compact disc).

### ***Claim Objections***

2. Claim 26 recites the limitation "said silicon substrate". There is insufficient antecedent basis for this limitation in the claim.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 12, 14, 22, 24, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takeuchi et al. (US 6411011) in view of Hammond (US 3826931).
5. With respect to claim 12, Takeuchi et al. discloses a set of resonators (items 4A-4D) that are integrated in a single crystal (Figure 8), the set of resonators comprising at least first and second resonators (items 4A-4D).

Takeuchi et al. does not disclose expressly that the set of resonators is intended to allow a temperature-stable time base to be produced; however, this is merely a functional limitation that does not impart structure. Also, the language "intended to allow" is not a positive recitation of this functionality. Takeuchi et al. does not disclose expressly that the resonators are designed to oscillate in modes of different type and with dimensions such that their frequency difference has at least a first thermal coefficient,  $\alpha$ , equal or close to zero. Again, the language "designed to oscillate in modes of different type" is a functional limitation that does not impart structure, and this language is not a positive recitation of the functionality.

Hammond teaches a set of resonators designed to oscillate in modes of different type (column 3, lines 54-62) and with dimensions such that their frequency difference has at least a first thermal coefficient,  $\alpha$ , equal or close to zero (column 1, line 29-39).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the different oscillation modes and zero-valued thermal coefficients of Hammond with the set of resonators of Takeuchi et al. for the benefit of providing a signal that is stable over a large temperature range (column 1, lines 20-23 of Hammond).

6. With respect to claim 14, the combination of Takeuchi et al. and Hammond discloses the set of resonators as claimed in claim 12. Hammond discloses that said first and second resonators are oriented at an angle such that said frequency difference has a second thermal coefficient,  $\beta$ , close or equal to zero (column 1, lines 29-39).

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7. With respect to claim 22, the combination of Takeuchi et al. and Hammond discloses the set of resonators as claimed in claim 12. Takeuchi et al. discloses that said first and second resonators each have a symmetrical structure formed by a central arm joining two rectangular plates, said resonators being able to be held in the middle part of said central arms (Figure 8).

8. With respect to claim 24, the combination of Takeuchi et al. and Hammond discloses the set of resonators as claimed in claim 12. Takeuchi et al. discloses that said resonators include piezoelectric excitation means (items 4A-4D).

9. With respect to claim 29, the combination of Takeuchi et al. and Hammond discloses the temperature-compensated time base comprising a set of resonators as claimed in claim 12. Hammond discloses means for exciting and sustaining their oscillations and means for generating a temperature-stable signal representative of the difference in the oscillation frequencies of said resonators (column 1, lines 25-39).

10. Claims 13 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takeuchi et al. in view of Hammond and Valette (US 7022249).

11. With respect to claim 13, the combination of Takeuchi et al. and Hammond discloses the set of resonators as claimed in claim 12.

Neither Takeuchi et al. nor Hammond discloses expressly that said single crystal is a single crystal silicon substrate.

Valette teaches a device having a single crystal silicon substrate (column 7, lines 47-49)

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the silicon substrate of Valette with the set of resonators of Takeuchi et al. as modified by Hammond as silicon is among the most commonly used substrate materials in the electronics industry.

12. With respect to claim 15, the combination of Takeuchi et al., Hammond, and Valette discloses the set of resonators as claimed in claim 13. Hammond discloses that said first and second resonators are oriented at an angle such that said frequency difference has a second thermal coefficient,  $\beta$ , close or equal to zero (column 1, lines 29-39).

13. Claims 16 and 19 rejected under 35 U.S.C. 103(a) as being unpatentable over Takeuchi et al. in view of Hammond and Kawashima (US 20060255882).

14. With respect to claim 16, the combination of Takeuchi et al. and Hammond discloses the set of resonators as claimed in claim 12.

Neither Takeuchi et al. nor Hammond discloses that said first resonator is designed to oscillate in an elongation mode.

Kawashima discloses a piezoelectric resonator that is designed to oscillate in the elongation mode (Paragraph 42).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the elongation mode of Kawashima with the set of resonators of Takeuchi et al. as modified by Hammond for the benefit of a high quality factor (Paragraph 10 of Kawashima). Also, the elongation mode is among several known equivalent modes of piezoelectric resonators (Paragraph 42 of Kawashima).

15. With respect to claim 19, the combination of Takeuchi et al. and Hammond discloses the set of resonators as claimed in claim 12.

Neither Takeuchi et al. nor Hammond discloses that said first resonator is designed to oscillate in a Lamé mode.

Kawashima discloses a piezoelectric resonator that is designed to oscillate in the Lamé mode (Paragraph 42).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the Lamé mode of Kawashima with the set of resonators of Takeuchi et al. as modified by Hammond as the Lamé mode is among several known equivalent modes of piezoelectric resonators (Paragraph 42 of Kawashima).

16. Claims 17, 18, 20, 21, 23, 25, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takeuchi et al. in view of Hammond, Valette, and Kawashima.

17. With respect to claims 17 and 18, the claim limitations therein are the same as those in claim 16; therefore, claims 17 and 18 are unpatentable over Takeuchi et al. in view of Hammond, Valette, and Kawashima for the same reasons as in claim 16.

18. With respect to claims 20 and 21, the claim limitations therein are the same as those in claim 19; therefore, claims 20 and 21 are unpatentable over Takeuchi et al. in view of Hammond, Valette, and Kawashima for the same reasons as in claim 19.

19. With respect to claim 23, 25, and 30, the claim limitations therein are the same as those in claims 22, 24, and 29, respectively; therefore, claims 23, 25, and 30 are unpatentable over Takeuchi et al. in view of Hammond, Valette, and Kawashima for the same reasons as in claims 22, 24, and 29.

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20. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takeuchi et al. in view of Hammond, Valette, and Yamada et al. (US 20050093397).

21. With respect to claim 26, the combination of Takeuchi et al. and Hammond discloses the set of resonators as claimed in claim 24. Takeuchi discloses a piezoelectric layer deposited on said central arms and electrodes for contacting, on the one hand, the piezoelectric layer and, on the other hand, the substrate (Fig 2).

Neither Takeuchi et al. nor Hammond discloses expressly that said piezoelectric excitation means comprises an AlN layer, or that the substrate is silicon.

Yamada et al. teaches the use of AlN as a piezoelectric material (Paragraph 33).

Valette teaches a device having a single crystal silicon substrate (column 7, lines 47-49).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the AlN of Yamada et al. and the silicon substrate of Valette with the set of resonators of Takeuchi et al. as modified by Hammond for the benefits of the high propagation velocity of AlN and as silicon is among the most common substrate materials in the electronic industry.

22. Claims 27 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takeuchi et al. in view of Hammond, Valette, Kawashima, and Yamada et al.

23. With respect to claim 27, the claim limitations therein are the same as those in claim 26; therefore, claim 27 is unpatentable over Takeuchi et al. in view of Hammond, Valette, Kawashima, and Yamada et al. for the same reasons as in claim 26.

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24. With respect to claim 28, the combination of Takeuchi et al., Hammond, Valette, Kawashima, and Yamada et al. discloses the set of resonators as claimed in claim 27. Valette discloses that said silicon substrate is doped and constitutes an electrode of the device (column 7, lines 52-56).

25. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takeuchi et al. in view of Hammond and Kishi (US 20020150141).

26. With respect to claim 31, the combination of Takeuchi et al. and Hammond discloses the set of resonators as claimed in claim 29.

Neither Takeuchi et al. nor Hammond discloses expressly that one of said resonators has a substantially higher oscillation frequency than the other or that said means for generating a temperature-stable signal further includes a frequency divider circuit for reducing the highest frequency before said difference in the oscillation frequencies is taken.

Kishi teaches a device having a set of resonators in which one of said resonators has a substantially higher oscillation frequency than the other or that said means for generating a temperature-stable signal further includes a frequency divider circuit for reducing the highest frequency before said difference in the oscillation frequencies is taken (Paragraphs 115-119).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the resonators of different frequency and the frequency divider of Kishi with the set of resonators of Takeuchi et al. as modified by Hammond for the benefit of an increased flexibility in the design (Paragraph 116 of Kishi).

**Conclusion**

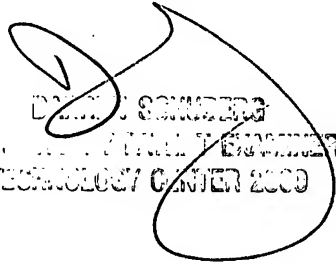
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Derek J. Rosenau whose telephone number is 571-272-8932. The examiner can normally be reached on Monday thru Thursday 7:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Darren Schuberg can be reached on 571-272-2044. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Derek J Rosenau  
Examiner  
Art Unit 2834

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10/5/2007

  
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